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C. Olin Ball
Department of Food Technology,
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TECHNOLOGY IN UNITED STATES

BARRON'S in its weekly discussion "How's Business," recently credited "venture capital" for technology with responsibility for the high level of American living standards. The following paragraphs are quoted.

There are apparently just two important roads to obtaining above average prices. One is monopoly, the other innovation. Only the latter works forever. Synthetic rubber illustrates the clash between the two. Malayan and Indonesian planters monopolistically kept up the price of rubber in the years between world wars, and thereby enjoyed big profits without working very hard. Stewart Alsop, writing from Malaya, recently reported what the rest of the story is likely to be:

" 'Pretty soon now,' an American rubber buyer remarked to this reporter, with that happy reverence for American technical proficiency which is almost an American religion, 'we'll be making synthetic at a price the natural plants can't possibly meet.' He stopped smiling. 'Then I guess I'll be out of a job.' "

The sad plight of the Malayan rubber planters still does not adequately explain why American business men have followed such a very different course. Anti-monopoly laws deserve part of the credit. But some startling and highly important innovations have come from the plants and laboratories of the American Telephone & Telegraph Co., which is virtually a monopoly. Today it takes less than three minutes to put a call through from New York to Chicago or Miami. A new long-distance dial system is the secret. But behind that secret lies another—intense competition within American Telephone, fertilized by a management technique which inflexibly forbids internal politics.

The profit motive is a nice phrase, and a significant one. Business men certainly do things because they seek profits. But that is true of British or Malayan or Hindu business men as well as Americans; the profit motive does not explain the essential difference.

"Venture capital" is another newly coined and attractive phrase. Without a doubt, during the nineteenth century and the early part of the twentieth century it was venture capital, provided almost entirely by rich men, which gave new inventions and development programs the seed money that enabled them to get started and eventually to prosper. A great deal has been written recently about scarcity of venture capital, and dire effects have been predicted. But the facts seem to belie the predictions. Television found its venture capital, even in the face of the fact that television broadcasting is still generally unprofitable, and so did many new postwar developments in the fields of electronics, plastics, aeronautics and what not.

This venture capital was found mostly in the treasuries of corporations. The essential factor which today probably has more to do with the rising American scale of living than any other is, in economists' jargon, the extremely low liquidity-preference-quotient of top management groups of American corporations. Would General Motors exchange a spender like Kettering for an expert on interest rates?

Our government, too, has contributed to the rate of capital formation more than its mere policing of the anti-trust laws. Early subsidies enabled both the railroads and airlines to get on their feet. The building of roads made the automobile age possible. The arrival of synthetic rubber was speeded by government wartime action.

But government subsidies are not particularly American. Nor can the American government be given credit for our high standards of food, clothing, transportation, or (the new law notwithstanding) housing. These blessings really stem from the utter disregard of financial problems evidenced by American business men.

Even bankruptcy deters them hardly at all. Notice what happens to the equipment of a railroad after it is declared insolvent. Compare the cars and comforts of the New Haven during the period of its receivership with those of its still solvent neighbors, the Central and Pennsy. Even Robert R. Young cannot do as much to spruce up the appearence of a railroad as a court reorganization.

The American economy will continue its brilliant rate of progress as long as our corporations are not too much restricted as to size, as long as technical proficiency is admired and as long as a low preference for liquidity is the road to individual success.

Selected Abstracts

ANALYTICAL METHODS

258I. Sodium and potassium in foods and waters. Determination by the flame photometer.

BILLS, C. E. et al. *J. Am. Diet. Assn., 25,* 304-14 (1949).

Sodium and potassium determination on about 500 foods and 150 public water supplies are presented. A discussion of the occurrence of sodium in foods and waters is given, together with incidental comparisons of analytical methods.

259I. Separation and estimation of saturated C_2-C_8 fatty acids by buffered partition columns.

MOYLE, V., et al. *Biochem. J., 43,* 308-17 (1948).

A new method is described for the identification, separation, and estimation of most of the steam-volatile members of the saturated series of fatty acids. The procedure is based on the principle of partition chromatography: heavily buffered silica gels, without indicator, form the stationary phase of the partition columns, the moving phase consisting of mixture of chloroform and butanol. Naturally occurring fatty acids from acetic to caprylic can be identified, quantitatively, separated, and estimated. Caprylic cannot, however, be separated from higher acids. Of the non-natural acids, oenanthic can be separated from lower but not from higher acids. Partial separation has been achieved between isomeric forms of valeric acid, but isomeric acids cannot, in general, be distinguished or separated. Acids can be recovered from the columns in quantities large enough to permit the preparation of characteristic derivatives. Optimal results are obtained with quantities of the order of 0.1 mmol. of each acid, whether taken separately or in mixture.

BIOLOGICAL SCIENCES

MICROBIOLOGY

260I. Effect of flesh acidity on bacterial numbers and trimethylamine in spoiling fish.

FARR, H. L. A., AND NEY, P. W. *Fish. Res. Bd., Canada, Pac. 78,* 11-13, Apr., 1949.

The amount of trimethylamine present is not a very sensitive measurement for bacterial spoilage.

261I. Longevity of the coliform bacteria and enterococci in iced crabmeat.

McCLESKEY, C. S., AND BOYD, JR., F. A. *J. Milk Food Tech., 12,* 108-9 (1949).

Average number of coliforms present in crabmeat samples tested at the end of a storage period was almost 100 times initial number, while number of enterococci remained practically unchanged.

262I. The effect of ultrasonic waves upon Klebsiella pneumoniae, Saccharomyces cerevisiae, Miyagawanella felis, and Influenza virus A.

HAMRE, D. J. *J. Bact., 57,* 279-95 (1949).

Using vibrations from a quartz crystal generator, it was found the distance between bottom of container and crystal, age of culture, and cell concentration had no effect on mortality of *K. pneumoniae* being treated. Liquid volume was important because deep layers were not efficiently cooled. The effect of broth and buffer solution is discussed. In no experiments were 100% of the cells or virus destroyed.

263I. DDT substitute.

Canning Tr., 71, 10 Apr. 18, 1949.

Methoxychlor is recommended by specialists at the University of Wisconsin as a substitute for DDT in fly control in dairy barns. A 2½% methoxychlor water suspension is recommended wherever an insecticide is to be applied to inside walls of buildings housing dairy animals, or wherever contamination of milk or milk products may occur. A ½% methoxychlor suspension is recommended for use on cattle.

264I. Quantitative comparison of insecticides.

HOFFMAN, I. *Pharmazie, 3,* 353-4 (1948); *Brit. Abst., BIII, 20,* Jan., 1949.

The toxicity (including symptoms) of DDT, HCN, arecoline, nicotine, CH_2:CH.CH_2.NCS (I) and CH_2Ph.CNS (II) to fish, tadpoles, snails, gnat larvae, *Daphnia* and *Enchytracae* has been studied. Arecoline is of only moderate toxicity; DDT and HCN show high toxicity to fish, amphibians, and insects, but crustaceans, gastropods and annelids are relatively insensitive to both. Against the three last-named, I and II are most effective. The results are discussed in terms of metabolic poisons (generally active except where an unusual type of metabolism occurs), nervous poisons (active against higher or lower organisms according as they affect generalized or specific centers), and general protoplasmic poisons (equally toxic to all organisms).

NUTRITION

265I. The effect of thyroxine on the metabolism of lactating cows. 1. General results and nitrogen metabolism.

OWEN, E. C. *Biochem. J., 43,* 235-43 (1948).

The effect of injecting 10 mg. thryoxine/day for 4 weeks into cows at three different levels of food intake has been investigated. The resultant increase in milk yield was accompanied by an increase in pulse rate, by loss of weight, by markedly negative nitrogen balance and by an increase in the excretion of water and creatine in the urine. The percent of fat in the milk was increased, and small but statistically significant increases were observed in the percent of solids and of nitrogen in the fat-free milk. Thyroxine appeared to stimulate lactation by increasing the cows' catabolism, and this resulted in negative nitrogen balances. The negative nitrogen balances could be inhibited by increasing the intake of food.

266I. The effect of thyroxine on the metabolism of lactating cows. 2. Calcium and phosphorus metabolism.

OWEN, E. C. *Biochem. J., 43,* 243-7 (1948).

Calcium excretion was markedly increased, attributably to faecal metabolic calcium, calcium reserves being readily depleted, resulting in a negative balance. Phosphorus balance, however, was positive, thyroxine increasing the amount of phosphorus retained. The calcium content of the milk was not affected by thyroxine but the phosphorus content was increased.

267I. Reduction of iron in the human stomach.

BERGEIM, O., AND KIRCH, E. R. *J. Biol. Chem., 177,* 591-6 (1949).

Studies have been made in human subjects on the intragastric reduction to the ferrous form of ferric iron present in, or added to, ingested foods. Very appreciable reductions occurred. Thus, a number of common foods such as breads, meats, and fruits gave iron reductions as high as 50 to 90 percent. Milk and eggs gave somewhat irregular results. Ascorbic acid, proteins, and protein digestion products appear to participate in the reduction of iron. The formation of insoluble complexes of ferric iron with proteins, phosphates, and other substances is a limiting factor.

FOOD PRODUCTS

CEREALS AND GRAINS

268I. Comparison of certain chemical, physical, and baking properties of commercial, Buhler, and Hobart-milled flours.

FINNEY, K. F., et al. *Cereal Chem., 26,* 72-80, Jan., 1949.

Commercial, Buhler, and Hobart flours were extracted from sub-samples of each of seven commercial lots of wheat, representing the classes soft red winter, hard red winter, and hard red spring. The three types of millings were compared with respect to flour yield, loaf volume potentialities, mixing and oxidation requirements, cookie spread factor and top grain, and other physical and chemical properties including granulation, baking absorption, gas production, and crude fat, ash, and protein contents.

269I. Hygroscopic equilibrium of rice and rice fractions.

KARON, M. L., AND ADAMS, M. E. *Cereal Chem., 26,* 1-12, Jan., 1949.

An investigation has been made of the rate of sorption and desorption of moisture by rough rice, head rice, bran, polish, and hulls over the range of 11 to 93% relative humidity at 25° C. The hygroscopic equilibrium of these same fractions has been determined over the same relative humidity range. If the relative humidity of the atmosphere at 25° C. is raised from 10 to 90%, the moisture content of whole rice and its fractions increases as follows: rough rice from 4.4 to 17.6%, polished rice from 5.2 to 18.8%, bran from 5.0 to 18.0%, polish from 5.3 to 18.0%, and hulls from 3.7 to 15.3%.

270I. Inactivation and removal of proteolytic enzymes from amylolytic supplements.

DIRKS, B. M., AND MILLER, B. S. *Cereal Chem., 26,* 98-109 (1949).

The addition of NaCl (4.3 M) to a fungal extract caused marked reduction of proteolytic activity and relatively little loss of amylolytic activity. Dialysis against 0.2% $CaCl_2$ solution for 36 hours did not reactivate the proteolytic enzymes. In the presence of NaCl (4.3 M), adjustment of the extract to pH 10.0 resulted in 80 to 90% reduction of the original proteolytic activity with a small, but significant, loss of α-amylase.

FATS AND OILS

271I. Rancidity of butterfat.

MUKHERJEE, S., AND GOSWAMI, M. *J. Indian Chem. Soc., 24,* 239-48 (1947); *Chem. Abst., 43,* 2337[a] (1949).

Both the hydrolytic and oxidative rancidity of butterfat are practically stopped for 5 months by the presence of dissolved H which is added at 60° to obtain maximum solubility. Other effective rancidity stabilizers for butterfat were pyrogallol, catechol, Na citrate, and Na K tartrate.

272I. Relation between odor, peroxide, aldehyde, and acid content of rancid lard.

HAMANN, V. *Dtsch. Lebensmitt. Rdsch., 44,* 161-162 (1948); *Brit. Abst. BIII, 89* (1949).

Souring plays no decisive part in the spoilage of lard, and the presence of ketones cannot be demonstrated. Aldehydes are formed from both saturated and unsaturated fatty acids, at the expense of peroxide formation, and determine the degree of spoilage.

273I. Norconidendrin: A new antioxidant for fats and oils.

FISHER, G. S., KAYME, L., AND BICKFORD, W. G. *Manuf. Conf., 29,* 24-6, Apr., 1949.

The preparation of norconidendrin from western hemlock

sulfite waste liquor is described. Norconidendrin has been shown to possess antioxidant activity in both hydrogenated and unhydrogenated cottonseed and peanut oils, in a peanut oil essentially free of natural antioxidants, and in lard. Its activity in these products is comparable with that of other polyphenolic antioxidants. Norconidendrin, as well as the other polyphenols tested, exhibited greater antioxidant activity in the particular peanut oils used than in several other vegetable oils, and still greater activity in substrates which contained only small amounts of natural antioxidants. The effectiveness of norconidendrin was found to be appreciably enhanced by the addition of acid-type synergists. It may be added either before or after deodorization with approximately equal effectiveness. When added before deodorization, it contributes no odor, color, or flavor to the finished oil. Practical application of norconidendrin in preserving food products should be postponed until toxicity studies have been conducted.

FRUIT AND FRUIT JUICES

274I. The effect of sunlight on the ascorbic acid content of strawberries.

Robinson, W. B. *J. Agr. Res., 78,* 257-62 (1949).

The synthesis of ascorbic acid in strawberries is stimulated by exposure to sunlight. With a 57% decrease in the amount of illumination during development and ripening, the ascorbic acid content averaged 36% lower. The data indicate that the degree of illumination of the leaves is the most important factor in this relationship. The amount of ascorbic acid in the ripe fruit appears to correspond to the amount of illumination on the fifth or sixth day prior to harvest. Differences in ascorbic acid content of strawberries on the fresh-weight basis occurred at different locations with the same amount of illumination. However, if the ascorbic acid is expressed on a dry-weight basis, the differences due to environmental factors other than sunlight were insignificant.

275I. Organic acids of some common fruits.

Bryan, J. D. *A. R. Agric. hort. Res. Sta. Bristol,* 138-40 (1946); *Brit. Abst. BIII, 88* (1949).

The malic, citric, and oxalic acid contents of gooseberry, tomato, apple, plum, blackcurrant, and rhubarb were determined. Citric and malic acids are the major components (80%-90%) of the fruit acids. Rhubarb contained 3-4% (dry wt.) of oxalic acid; in fruits the value was <0.2%.

276I. Factors influencing composition of tomato.

Pollard, A., Kieser, M. E., and Bryon, J. D. *J. Soc. Chem. Ind., Lond., 67,* 281-283 (1948); *Brit. Abst., BIII, 10,* Jan., 1949.

Values for ascorbic acid, sugar and free acid content of 7 varieties of commercial tomatoes have been obtained over 4 years. Differences in composition are due to variety and cultural treatment. Fruit produced under glass contained less ascorbic acid, more sugar, and had a better flavor than did fruit grown out of doors. The values of the three components could not be related to number of hours of sunshine or to air temperature at harvesting time. The yield of ascorbic acid per plant is more related to cropping capacity than to the ascorbic acid concentration of individual fruit.

277I. Behavior of SO_2 in concentrated orange juice.

Ingram, M. *Food Res., 14,* 54-71, Jan.-Feb., 1949.

Observations were made of total (distillable) and free (iodine-titratable) SO_2 in 65° Brix concentrated orange juices under various conditions of treatment and storage. Recoverable SO_2 diminished in storage, losses being accelerated by temperature increase, especially above 20° C. During fermentation, there was no substantial change in total SO_2.

MEAT AND FISH

278I. Effect of ozone on microbial growth on beef muscle, and on the flavor of beef fat.

Kefford, J. F. *J. Council Sci. Ind. Research, 21,* 116-40 (1948); *Chem. Abst., 43,* 781[h] (1949).

Studies of the growth of microorganisms on beef muscle slices and on artificial media, in the presence of O_3, established the importance of surface moisture content in determining the magnitude of the effect of O_3 on microbial growth. O_3 applied for 3 hours daily in concentration of 3-5 p.p.m. had no effect on bacterial growth at 1-5° on muscle at full moisture content and only a slight retarding effect at moisture contents around 180% (as % dry weight); but when the moisture content was below 150%, a useful extension of storage life was possible, provided ozonization commenced during the lag phase of bacterial growth. O_3 treatment under the conditions mentioned produced readily detectable taints in beef fat in 3-5 days and darkening of muscle pigments in 5-6 days. A KI absorption method for the determination of O_3 in concentration down to 1 p.p.m., and a small all-glass ozonizer, are described.

279I. Behaviour of water-soluble nitrogen compounds during the drying of meat.

Grau, R. *Ztschr. Lebensmittel-Untersuch. Forsch., 86,* 188-95 (1943); *Nutr. Abst. Rev., 18,* 290, No. 1699 (1948).

Loss of flavour during the drying of lean beef was paralleled by a decrease in the water-soluble N. Higher drying temperature caused greater difference. A very small amount of volatile nitrogenous compounds was recovered during drying by freezing the evaporated water and washing the air stream with alcohol, acid and alkali solution. It was concluded that the soluble N-containing substances are coagulated by heat.

280I. Composition and nutritive value of fresh cooked and processed swordfish.

Lopez-Matas, A., and Fellers, C. R. *Food Res., 13,* 387-95 (1948).

Samples of swordfish were frozen, dehydrated, and canned, and analyzed for protein, amino acids and vitamin content. The ten essential amino acids were found present in swordfish in amounts very similar to those present in beef. Canning and broiling as compared with freezing did not significantly affect the essential amino-acid composition. The dehydrated sample showed losses which are considered significant. Pantothenic acid and choline were present in frozen swordfish in moderate to high amounts. After the processes of dehydration, canning, and broiling, good retention was observed, in general, for Vitamin A, riboflavin, and nicotinic acid and low retention for thiamin and biotin. The growth-promoting values of the proteins of swordfish muscle, beef, and chicken were determined for albino rats, using "paired" feeding technique. They were found to be approximately the same.

NUTS

281I. Thiamin, riboflavin, and niacin content of walnuts.

Jentsch, M. S., and Morgan, A. F. *Food Res., 14,* 40-3, Jan.-Feb., 1949.

The riboflavin content of these walnut samples determined by the microbiological method was usually found to be about 20% less than appeared present when the flourometric method was used. There was little loss of riboflavin in storage, up to 42 months, whether the kernels were stored in or out of the shells. The Placentia, Payne, and Franquette nuts contained 0.13 to 0.16, 0.11 to 0.16, and 0.10 to 0.12 mg. % riboflavin. Niacin, determined by the microbiological method, was also retained well in storage, whether the kernels were in or out of the shells. The Placentia, Payne, and Franquette nuts contained 0.81, 0.73, and 0.58 mg. percent niacin. Comparable values were found in the nuts of the four crops, but in all cases the Franquette variety appeared to contain 20 to 30% less of each of the three vitamins than did the other two varieties, which were alike in value. Dark-colored kernels of the 1945 Placentias contained 25 to 30% less of thiamin and riboflavin than did the comparable light- and amber-colored ones.

282I. Salted nuts and process for making the same.

Kelly, W. W. 2,468,078, Apr. 26, 1949.

The process of preparing salted nuts, consisting in roasting shelled raw nuts under dry condition so as to expel all moisture quickly therefrom, applying a moisture-repellant coating to only the outer surface of each nut under substantially moisture-free condition so as to provide at once a moisture-proof coating upon the nuts and thereby preserve their freshness, flavor and crispness, cooling the nuts, and applying salt to only the outer surface of the edible coating.

VEGETABLES

283I. Conserving vitamin C in peas during processing.

MOYER, J. C., ROBINSON, W. B., AND KERTESZ, Z. I. *Canner, 108,* 18-9, Apr. 23, 1949.

Vitamin C losses were found to be due to the leaching action of hot water during blanching and to enzymatic destruction. The losses due to enzyme action varied with the blanch temperature. A short, high temperature blanch yielded more nutritious peas than a low blanch temperature.

284I. The vitamin C content of dehydrated potatoes.

KRONER, W., AND LAMEL, H. *Spiritusindust., 65,* 143-4 (1942); *Biol. Abst., 22,* 2365, No. 23503 (1948).

The 2, 6-dichlorophenol-indophenol method is not appropriate for determining the vitamin C content of dehydrated potatoes. The dye reducing capacity of the potato decreases during the first stages of dehydration, reaching its lowest point at a water content of about 65% of the fresh material. With further dehydration, the reducing capacity increases again. This is evidently due to reducing substances other than ascorbic acid. For the determining of the anti-scorbutic activity of dehydrated potatoes, it is necessary to use an animal test instead of the titrimetric method of Tillmans.

285I. Use of growth-substance to inhibit the sprouting of potatoes in storage.

LUCKWILL, L. C. *A. R. agric. hort. Res. Sta. Bristol,* 79-84, 1946; *Brit. Abst., BIII, 16,* Jan. 1949.

Sprouting of stored potatoes was inhibited by treatment with Me naphthylacetate (1). Shredded newspaper and talc were satisfactory carriers for the growth substance, but dry soil rendered the treatment ineffective. Best results were obtained by use of 0.5-3.0 oz. of (1) per ton of tubers according to the period of preservation desired.

286I. Folic acid in vegetables and certain other plant materials.

FAGER, E. E. C. et al. *Food Res., 14,* 1-8, Jan.-Feb., 1949.

A hog kidney conjugase has been used to liberate bound folic acid in plant materials. The folic acid contents of samples of fresh and canned vegetables, grains, and breakfast cereals are reported. Folic acid in fresh vegetables is maintained at 4 to 5° C. refrigeration.

News of the Institute

(Continued from page 2 preceding technical papers)

the 1930's he attended the Quartermaster Subsistence School, located at the Chicago Quartermaster Depot, and later served on the instructional staff of this organization. In the 1920's as an infantry officer he developed a keen interest in rations and sought to improve the methods of handling and preparing them. Even in that period, when war seemed remote, he realized the military implications of his favorite slogan—"better food for a stronger nation." Later on, in ways already mentioned, he was instrumental in giving substance to this slogan.

Colonel Lawrence has published a number of articles in Army and industrial journals and is widely in demand as a convention speaker. His versatility enables him to delight his audience with a tall tale from his beloved South and to pass from that to a clear exposition of a weighty technical problem or a difficult point of policy. On retirement from the Army, Colonel Lawrence will maintain two important ties with the industrial family. His I. F. T. secretaryship will on the one hand keep him in close touch with the food industries and his recent affiliation with Commonwealth Equipment, Inc., will serve on the other to maintain his interest in materials handling equipment.

WORLD PRODUCTION OF LIVESTOCK AND MEAT

F. A. O. Commodity Series No. 12 reported as follows:

"The volume of world meat production in 1948 is estimated to have been from 5 to 10 percent less than the 1934-38 annual average and slightly less than 1947 production. Europe's production was still at only 62 percent of the 1934-38 average and showed no significant increase over 1947. Pork production in Europe was at only 55 percent of the prewar level, and beef and veal at 71 percent. In North America, on the other hand, meat production in 1948 was at 135 percent of prewar, and in Oceania and South Africa it was 9 percent above the prewar average for these regions.

"World livestocks numbers in early 1948 were not far different from prewar; there had been a slight rise in cattle numbers and a drop of 5 or 6 percent in numbers of hogs and sheep. European livestock numbers have expanded very little since 1945. Hog numbers in Europe in 1948 were about 61 percent of prewar, cattle numbers about 84 percent, and sheep numbers about 80 percent. Cattle numbers in North and South America, on the other hand, expanded significantly during this period.

"The livestock-feed situation for 1948-49 is much improved over that of a year earlier, and more favorable than it has been since before the war. In Europe, feed concentrate supplies in relation to livestock numbers are again near the prewar level, and in Canada and the United States concentrate feeds per consuming animal unit are the highest on record. As a result, some expansion in livestock numbers is expected to occur in 1949, particularly in hog numbers. Most European and North American countries are expecting a substantial increase in the 1949 spring pig crop as compared with 1948, and cattle and sheep numbers in Europe are likely to advance slightly.

"Almost 90 percent of the world's meat is consumed in the regions where it is produced. The chief meat-producing countries, therefore, have the highest per caput meat consumption rates. Consumption in Argentina, Uruguay, and Australia in 1948 averaged 110 kilograms per person. In North America, although some reduction has occurred as compared with 1947, consumption in 1948 was still considerably above the prewar level, the per caput average in Canada and the United States being 71 kilograms as compared with 60 kilograms prewar. In contrast, the consumption rate in Europe in 1948 was about 23 kilograms per person, a rate that is only 62 percent of the 1934-38 average. In India and Japan it was about 3 kilograms."

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